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STATE OF WASHINGTON

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Governor

DEPARTMENT OF ECOLOGY

7272 Cleanwater Lane, Olympia, Washington 98504 206/753-2353

MEMORANDUM
May 2, 1979

To: Douglas Houck

From: Eric Egbers

Subject: Longview STP Class II Inspection

Introduction:

A Class II inspection was conducted at the Longview Sewage Treatment Plant (STP) on February 27-28, 1979. In attendance were Eric Egbers (DOE Water and Wastewater Monitoring Section), Douglas Houck and Gerald Calkins (DOE Southwest Regional Office), and Richard Williams (Longview STP Operator). Composite and grab samples were collected and transported to DOE laboratory in Tumwater for analysis. A follow-up visit occurred on March 21, 1979. Grab composite samples were split and analyzed as before.

The Longview wastewater treatment facility consists of two faculative ponds operated in parallel. Influent flow enters the headworks, through a comminutor, and proceeds to a 9-inch Parshall flume. It then is split and distributed to the two ponds via two pipes run in parallel above the surface of the ponds. One pipe discharges near shore while the other toward the center of the pond. Pond effluents are combined and flow to a covered clarifier where aluminum sulfate (alum) is administered. The flow leaves the clarifier and flows through another 9-inch Parshall flume, is split, and proceeds to two chlorine contact chambers run in parallel. The two flows are again combined and discharged to Coal Creek Slough, surface water segment 12-25-03. The five-year water quality strategy identifies this segment as presently meeting the state and federal water quality goal.

Findings and Conclusions:

At the time of this inspection, the treatment facility's effluent was not in compliance with its NPDES permit monthly average limitation for:

1. 85% reduction of BOD_5 or TSS;
2. pounds per day of BOD_5 or TSS discharged; and
3. total plant flow discharged.

As a means of settling out the high concentration of algae present in the effluent, a clarifier was built and alum addition was recommended. At the time of this survey, the clarifier was not in operation because it had settled considerably since construction. Alum addition had ceased because of the inoperable clarifier and a corroding feed system. Both problems contribute to the facility's failure to comply with its NPDES permit limitations for 85% reduction and pounds per day discharged of BOD_5 and TSS. These problems must be remedied as soon as possible.

Infiltration and inflow (I and I) is a continuing problem with this treatment facility. Studies have been conducted and recommendations made, but the problem has yet to be remedied. Recorded influent flow is equivalent to a contributing population of seven times that which is actually served.[1] The collection system, leading to this facility, must be immediately repaired. The facility's failure to comply with its NPDES permit limitation for total effluent flow can be attributed to the I and I.

The accuracy of the two Parshall flumes and recording devices is within the allowed 15% of calculated flow. The only discrepancy found was the throat walls not being square. This problem is often caused by the concrete behind the fibreglass walls of the flume which bows the walls slightly. This problem is minor, but important enough to be mentioned. The presence of a Parshall flume and flow recording device on both the influent and effluent makes it possible to monitor the "loss" due to leakage and evaporation. At the time of this survey, the flow lost through the ponds was approximately one-quarter of the influent flow. This was the difference recorded by the influent and effluent flow measuring devices.

Sampling procedures and locations were adequate, with the exception of final effluent dissolved oxygen collection. Mr. Williams was collecting the sample from the chlorine contact chamber outfall and employing the azide modification Winkler technique for analysis. It was explained that chlorine is an oxidizing agent and will oxidize a portion of the sodium thiosulfate used, thus yielding a higher dissolved oxygen result than that which really exists. It was recommended that he collect his sample from the effluent prior to chlorination. Also it was recommended that automatic composite samplers be purchased to eliminate the biased "8 to 4" hourly grab composite and yield a more representative total sample.

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[1] Hammer, M. J., 1975. *Water and Wastewater Technology*, John Wiley and Sons, Inc., 298 pp.

The 24-hour composite samples were split with Mr. Williams to compare results of BOD_5 and total suspended solids analysis with that of the DOE laboratory. The results (Table 1) did not compare very well and it was concluded that a follow-up visit to the treatment plant was warranted. The facility's 8-hour grab composite was split and analyzed as before, but DOE personnel were present when Mr. Williams performed his set-up procedure. The results of analysis comparison (Table 2) were quite good. For a review of the laboratory procedures, refer to "A Review of Laboratory Procedures and Techniques" found elsewhere in this report.

One other feature of the facility warrants mentioning. Each chlorine contact chamber measures approximately 50 feet by 10 feet, yielding a length-to-width ratio of 5 to 1. The optimum length-to-width ratio of greater than 40 to 1 will provide a distribution of contact chamber residence times approaching plug flow.[2]

In summary, the following are recommended:

1. Repair settling clarifier and replace any corroded hardware associated with the alum feed.

2. I and I problem remedied as soon as possible.

3. Purchase automatic composite samplers.

In conjunction with the regional follow-up inspection (mid-June 1979), the following recommendations should be reviewed with the operator, noting those which have been implemented:

1. Plans for clarifier repair and alum addition.

2. Measuring final effluent dissolved oxygen prior to chlorination.

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[2]Water Pollution Control Federation, 1977. *Wastewater Treatment Plant Design, Manual of Practice #8,* 394 pp.

Review of Laboratory Procedures and Techniques:

All required laboratory analyses are performed at the Longview STP excluding fecal coliform, which is analyzed by Cowlitz County Health Department.

BOD_5

1. The Winkler Azide Modification Method is used for the determination of dissolved oxygen. It is recommended that Mr. Williams prepare all reagents according to either "Standard Methods" or "Laboratory Test Procedure for BOD, DOE 1977".

2. The laboratory pH meter should be calibrated with at least two different buffers before use on wastewater samples.

3. Recommend placing the internal incubator thermometer in a water bath at the same height the samples are kept.

4. The carboy used for distilled water storage should be either placed in the dark or painted black to discourage algae growth.

TSS

1. Gooch Crucible Method employed using Whatman GF/A 2.1 cm filter. Mr. Williams expressed a desire to switch to the filter funnel method, enabling him to filter more sample through at one time. Whether or not he goes to the latter method, I suggested he switch to the approved Reeve Angel 934AH or Gelman Type A/E filter paper.

2. Recommend a sample volume of at least 50 ml on the influent and 100 ml on the effluent.

EE:cp

Class II Field Review and Sample Collection
24 Hour Composite Sampler Installations

Sampler	Date and Time Installed	Location
1. Influent aliquot - 250 ml/30 min.	2/27/79 @ 1130	Headworks prior to Parshall Flume
2. Unchlorinated Eff. aliquot - 250 ml/30 min.	2/27/79 @ 1100	Collection structure prior to Parshall flume and contact chambers
3. Chlorinated Effl. aliquot - 250 mg/30 min.	2/27/79 @ 1100	Manhole prior to discharge into Coal Creek Slough

Grab Samples

	Date and Time	Analysis	Sample Location
1.	2/27/79 @ 1345	Total Residual Chlorine	Manhole prior to discharge into
2.	2/28/79 @ 1105	Total Residual Chlorine	Coal Creek Slough
3.	2/28/79 @ 1105	Fecal Coliform	" " " "
4.	2/28/79 @ 1200	Total Residual Chlorine	" " " "
5.	2/28/79 @ 1200	Fecal Coliform	" " " "
6.			

Flow Measuring Device

1. Type - Parshall Flume on influent and effluent prior to contact chambers
2. Dimensions - 9-inch throat width

a. Meets standard criteria /X/ Yes (see text)

/ / No Explain:

b. Accuracy check

	Actual Instan. Flow	Recorder Reading	Recorder Accuracy (% of inst. flow)
1. Influent	2.39 mgd	2.75 mgd	87%
2. Effluent	1.72 mgd	1.75 mgd	93%
3.			

/X/ is within accepted 15% error limitations

/ / is in need of calibration

Field Data

Parameter	Date and Time	Sample Location	Result
Temperature	2/27/79 @ 1320	Influent	10.6
pH	2/27/79 @ 1320	Influent	6.5
Conductivity	2/27/79 @ 1320	Influent	262
Temperature	2/28/79 @ 1140	Influent	10.3
pH	2/28/79 @ 1140	Influent	6.7
Conductivity	2/28/79 @ 1140	Influent	370
Temperature	2/27/79 @ 1240	Chlorinated Eff.	8.9
pH	2/27/79 @ 1240	Chlorinated Eff.	7.0
Conductivity	2/27/79 @ 1240	Chlorinated Eff.	283
Temperature	2/28/79 @ 1050	Chlorinated Eff.	8.3
pH	2/28/79 @ 1050	Chlorinated Eff.	6.9
Conductivity	2/28/79 @ 1050	Chlorinated Eff.	275

Table 1 Original visit to Longview STP February 27-28, 1979

The following table is a comparison of laboratory results from 24 hour composite(s) together with NPDES permit effluent limitations. Additional results pertinent to this inspection have also been included.

	DOE Results			Longview Results		NPDES (Monthly average
	Influent	Unchlor. Effluent	Chlor. Eff.	Influent	Unchlor. Effluent.	
BOD_5 mg/l	57	18	12[1]	114	38	30
lbs/day	863	273	182	1727	576	179
TSS mg/l	67	39	30[2]	190	20	30
lbs/day	1015	591	454	2878	303	179
Total Plant Flow MGD			1.816			<0.715
Fecal Coliform (col/100 ml)			<10			200
Total Chlorine Residual (ppm)			1.5			
pH	6.9	7.2	7.2			6.0-9.0
Conductivity (μmhos/cm)	273	297	293			
Turbidity (mg/l)	50	20	20			
COD (mg/l)	120	92	84			
NO_3-N (mg/l)	.6	<.1	<.1			
NO_2-N (mg/l)	<.1	.2	<.1			
NH_3-N (mg/l)	5.4	7.8	8.0			
O-PO_4-P (mg/l)	1.6	2.4	2.2			
T-PO_4-P (mg/l)	5.5	3.6	3.5			
Total Solids	261	219	224			
T. Non Vol. Solids	151	135	134			
T.S. Non Vol. Solids	26	12	10			

* Field Analysis "<" is "less than" and ">" is "greater than"

[1] 79% Removal

[2] 55% Removal

Table 2. Follow-up Visit to Longview STP March 20, 1979

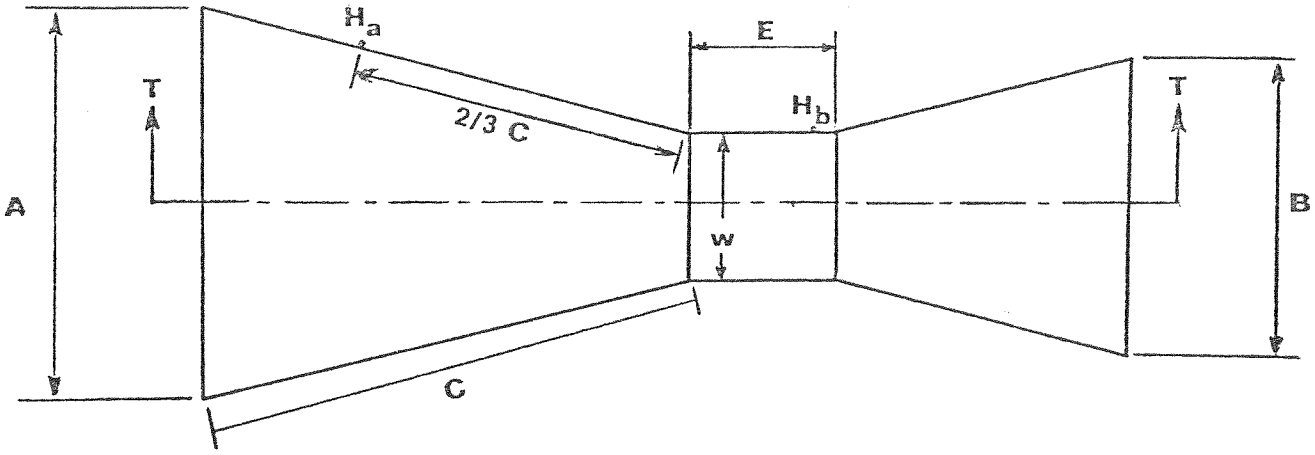
	DOE			Longview STP		NPDES (Monthly Average)
	Influent	Unchlor. Effluent	Percent Removal	Influent	Unchlor. Effluent	
BOD_5 (mg/l)	100	20	80	109	23	30
lbs/day	1334	267		1455	307	179
TSS (mg/l)	140	40	71.4	120	60	30
lbs/day	1868	534		1601	801	179
Flow (MGD)					1.6	
COD (mg/d)	230	110				
Total Solids (mg/l)	370	236				
T. Non Vol. Solids (mg/l)	195	147				
T. Sus. Non Vol. Solids (mg/l)	28	4				

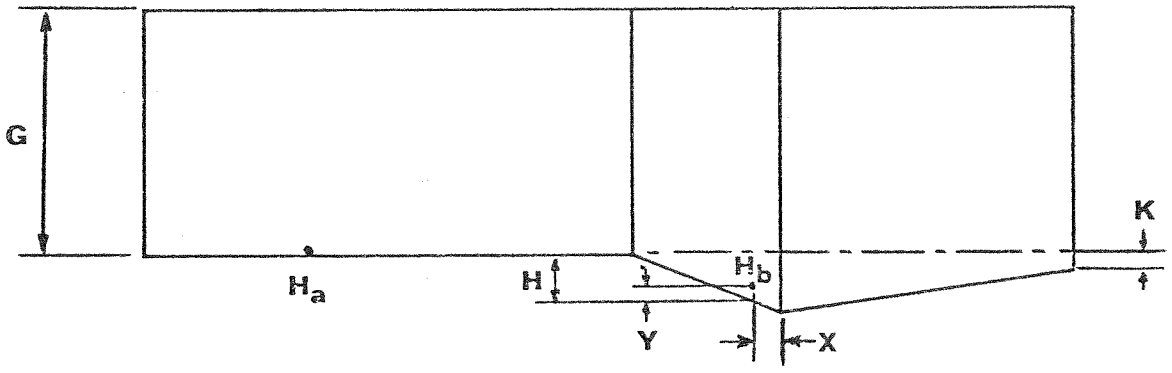
* Field Analysis

"<" is "less than" and ">" is "greater than"

PARSHALL FLUME:

Dimensions & Flow

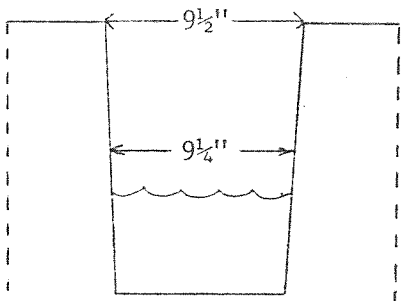




Code	Spec's I	Spec's E	Measured I	Measured E
A	225/8		22½"	22½"
B	15"		15"	15"
C	345/8		35"	35"
2/3 C	231/8		23"	23"
E	12"		12"	12"
G	24"		29½"	29½"
H				
K				
W	9"	9"	93/8"	93/8"
X				
Y				

Time	H_a	H_b	Theoretical Flow	Recorded Flow	
E 1310	11"		1.72*	1.75 MGD	98%
I 1335	13½"		2.39	2.75 MGD	87%

*Assuming 9" throat width



(Effluent)

Throat walls seem to be the only walls not true. Others seem to be level.